

### ABSTRACT OF THE DISCLOSURE

A method for producing ultra-high power density solid oxide fuel cells (SOFCs). The method involves the formation of a multilayer structure cells wherein a buffer layer of doped-ceria is deposited intermediate a zirconia electrolyte and a cobalt iron based electrode using a colloidal spray deposition (CSD) technique. For example, a cobalt iron based cathode composed of (La,Sr)(Co,Fe)O (LSCF) may be deposited on a zirconia electrolyte via a buffer layer of doped-ceria deposited by the CSD technique. The thus formed SOFC have a power density of 1400 mW/cm<sup>2</sup> at 600 °C and 900 mW/cm<sup>2</sup> at 700 °C which constitutes a 2-3 times increased in power density over conventionally produced SOFCs.

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